CLAIMS

1. A method of correcting fixed pattern noise (FPN) in image signals generated by image cells of an image sensor, each image signal comprising a plurality of instantaneous image values, the method comprising the steps of:

a) defining at least two value ranges of possible instantaneous image values that the image signals might take at a specific instant of time,

b) providing a plurality of sets of correction coefficients for calculating corrected values from the instantaneous values, wherein the sets of correction coefficients are adapted to transform the instantaneous values onto a predefined approximation characteristic,

c) determining in which of the at least two value ranges a specific instantaneous value of the image signals is located,

d) selecting a specific set of correction coefficients from the plurality of sets of correction coefficients as a function of the result of step c), and

e) calculating the corrected value for the image signal using the set of correction coefficients selected,

wherein the approximation characteristic is a section of a parabola for at least one value range.

2. The method of claim 1, wherein the approximation characteristic is a section of a parabola for a first value

range and a straight line for a second value range, the first value range covering two decades of brightness.

3. The method of claim 1, wherein steps c) to e) are carried out separately for the image signals of each image cell.

4. The method of claim 1, wherein an individual set of correction coefficients is used for each value range and for each image cell from the plurality of image cells.

5. The method of claim 1, wherein the at least two value ranges are individual for each image cell.

6. A method for FPN correction of image signals generated by image cells of an image sensor, comprising the following steps,

a) determining in which value range out of at least two value ranges a value of an image signal is located at a predetermined instant of time; and

b) determining a corrected value for the image signal as a function of the result according to step a).

7. The method of claim 6, wherein steps a) and b) are carried out separately for the image signal of each image cell.

8. The method of claim 6, wherein the step of determining the corrected value according to step b) comprises the following substeps:

b1) selecting correction coefficients from a plurality of sets of correction coefficients as a function of the result according to step a); and

b2) calculating the corrected value for the image signal by using the selected correction coefficients.

9. The method of claim 8, wherein the sets of correction coefficients are individual for a plurality of image cells.

10. The method of claim 8, wherein an individual set of correction coefficients is used for each value range.

11. The method of claim 6, wherein the at least two value ranges are different for a plurality of image cells.

12. The method of claim 8, wherein the step of calculating according to substep b2) is executed for all image cells by means of transformation equations which only differ due to different correction coefficients selected.

13. The method of claim 12, wherein the transformation equations are specified by an arrangement of logic elements which are supplied with the correction coefficients from a memory.

14. The method of claim 13, wherein the logic elements comprise an arrangement of adders and multipliers.

15. The method of claim 8, wherein said correction coefficients are determined from a comparison of an actual characteristic, which specifies a relationship between an optical intensity impinging on the respective image cell and the image

signal generated, with a nominal characteristic, for each image cell.

16. The method of claim 15, wherein the nominal characteristic is determined by computing a mean value from the actual characteristics of the image cells.

17. The method of claim 15, wherein the at least two value ranges are specified such that the actual characteristics and the nominal characteristic each are approximately linear with respect to the logarithm of the optical intensity impinging on the image cells within the respective value ranges.

18. The method of claim 17, wherein, for each image cell and for each of the at least two value ranges, the corrected value for the image signal is determined from an actual value generated by the image cell based on a transformation equation of the following form

$$V_c = a \cdot V_r + b$$

where a and b are correction coefficients of the transformation equation that are determined from a comparison of the actual characteristic and the nominal characteristic.

19. The method of claim 18, wherein the correction coefficients a and b are

$$a = \frac{a_i}{a_r} \text{ and } b = b_i - \frac{a_i}{a_r} b_r$$

for the nominal characteristic in the corresponding value range being approximated by the equation

$$V_i = a_i \cdot \log E + b_i$$

and the actual characteristic being approximated by the equation

$$V_r = a_r \cdot \log E + b_r$$

where E is a measure of the optical intensity impinging on the relevant image cell.

20. The method of claim 19, wherein the coefficients a_r and b_r are determined from actual characteristics of the image cells by a method of minimum square errors.

21. The method of claim 19, wherein the coefficients a_i and b_i are determined by computing a mean value of the coefficients a_r and b_r over all image cells.

22. The method of claim 8, wherein the correction coefficients transform the value of the image signal onto a predefined approximation characteristic.

23. The method of claim 22, wherein the predefined approximation characteristic is a straight line for at least one value range.

24. The method of claim 22, wherein the predefined approximation characteristic is a section of a parabola for at least one value range.

25. The method claim 22, wherein the predefined approximation characteristic is a section of a parabola for a first value range and a straight line for a second value range, the first value range covering two decades of brightness.

26. A device for the FPN correction of image signals generated by image cells of an image sensor, comprising:

a discriminator for determining in which value range out of at least two value ranges an instantaneous value of an image signal is located at a predetermined instant of time,

a correction device for determining a corrected value for the image signal as a function of the result determined by the discriminator.

27. The device of claim 26, wherein the correction device comprises:

a selector for selecting correction coefficients from a plurality of sets of correction coefficients as a function of the result determined by the discriminator, and

a transformation unit for calculating the corrected value for the image signal by using the selected correction coefficients.

28. The device of claim 27, wherein the transformation unit comprises an arrangement of logic elements and a memory adapted to store correction coefficients for supplying to the logic elements.

29. The device of claim 28, wherein the transformation unit comprises a series circuit of a multiplier and an adder.

30. The device claim 28, wherein the selector is adapted to control the supplying of the correction coefficients from the memory to the logic elements.

31. The device of claim 28, wherein the memory is adapted to be supplied with information relating to the image cell which is to be read out.

32. The device of claim 26, wherein the discriminator is connected to a threshold memory adapted to store threshold values which are individual for at least a number of image cells.

33. The device of claim 27, wherein the discriminator is connected to a threshold value calculating unit adapted to calculate threshold values from the correction coefficients supplied.

34. A digital camera comprising an image sensor having a plurality of image cells and a device for the FPN correction in image signals of the image cells, the device comprising:

a discriminator for determining in which value range out of at least two value ranges an instantaneous value of an image signal is located at a predetermined instant of time,

a correction device for determining a corrected value for the image signal as a function of the result determined by the discriminator.

35. The digital camera of claim 34, wherein the correction device comprises:

a memory for storing a plurality of sets of correction coefficients for calculating corrected values from the instantaneous values, wherein the sets of correction coefficients are adapted to transform the instantaneous values onto a predefined approximation characteristic,

a selector for selecting a specific set of correction coefficients from the plurality of sets of correction coefficients in response to the discriminator, and

a calculator for calculating the corrected value for the image signal using the set of correction coefficients selected,

wherein the approximation characteristic is a section of a parabola for at least one value range.

36. The digital camera of claim 35, wherein the approximation characteristic is a section of a parabola for a first value range and a straight line for a second value range, the first value range covering two decades of brightness.